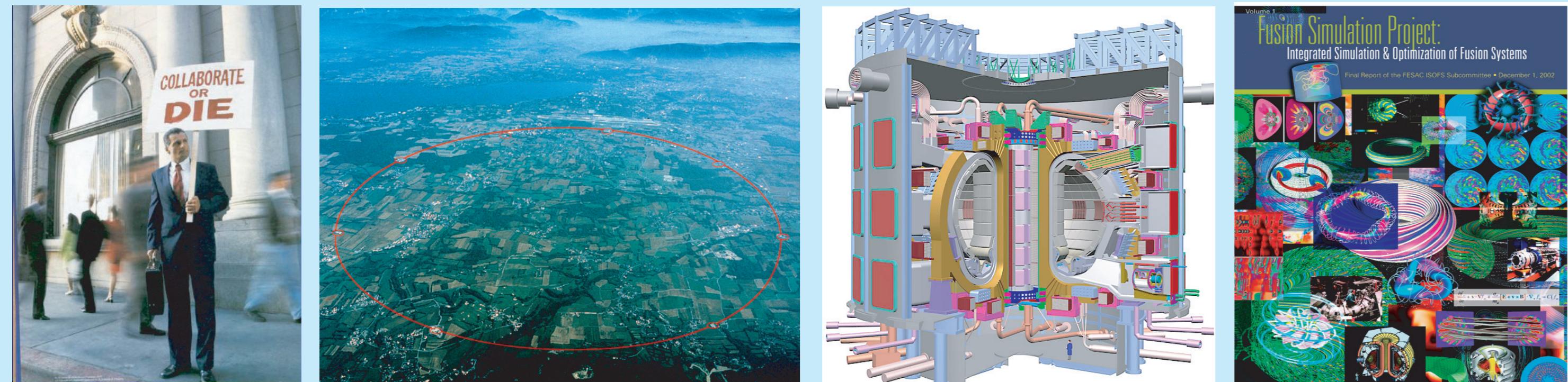


D.P. SCHISSEL and E.E. GOTTSCHALK*

INTRODUCTION

COLLABORATION TECHNOLOGY CRITICAL TO FULLY EXPLOIT PRESENT AND FUTURE FES AND HEP FACILITIES

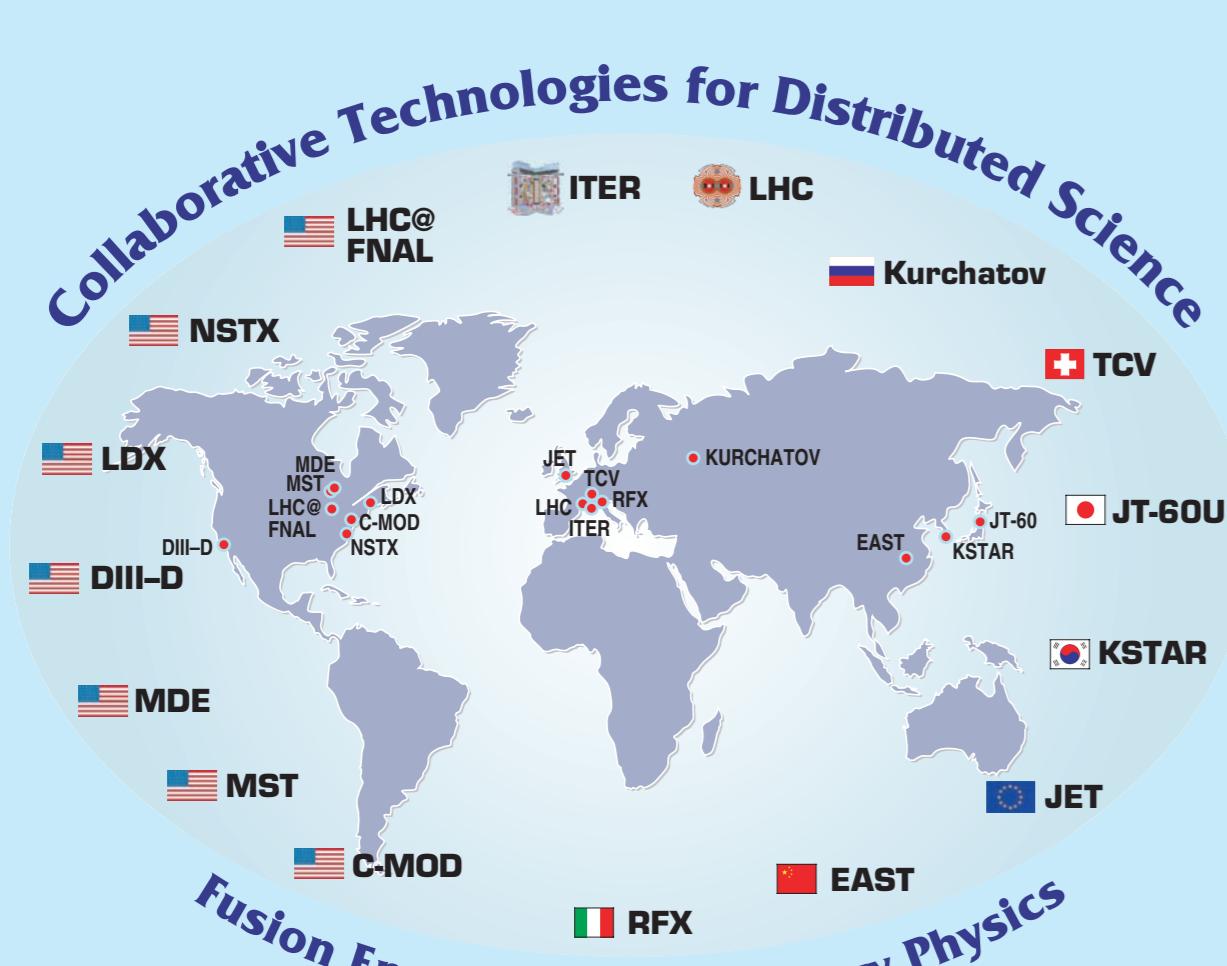


FES AND HEP SCIENCE TODAY AND IN THE FUTURE IS VERY MUCH A TEAM SPORT

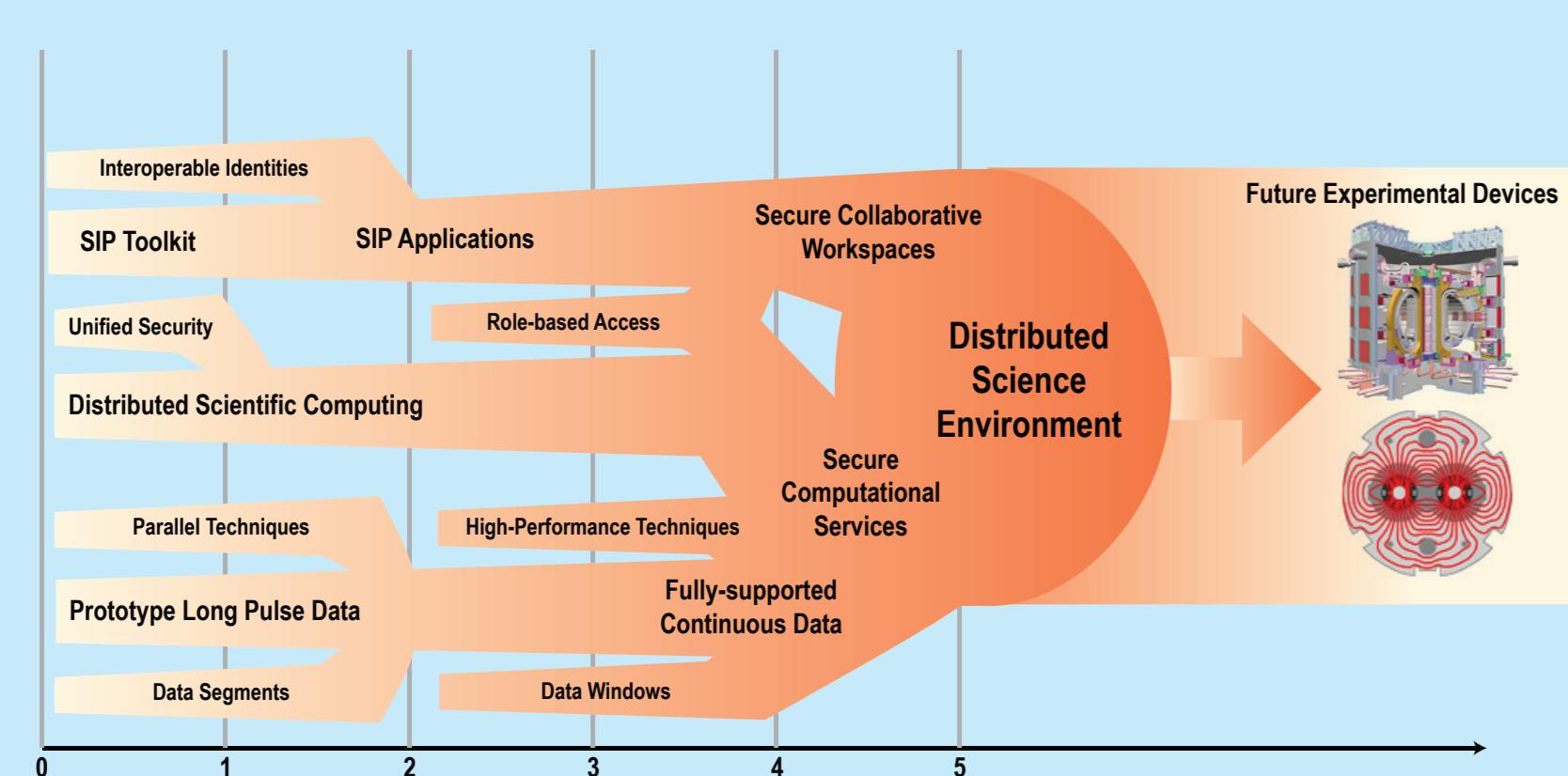
For Example Today:
The DIII-D National Fusion Facility



For Example The Future:
ITER



DISTRIBUTED SCIENCE ENVIRONMENT: COORDINATED EFFORTS TO BUILD A SECURE COLLABORATIVE WORKSPACE AND SECURE COMPUTATIONAL SERVICES



- Remote operation of experimental facilities, distributed code development, computing and visualization, and a wide range of planning and coordination activities.

COLLABORATIVE WORK SPACE

- Present systems fall short: stand-alone, only address interactive communications rather than long-term collaborations, address devices and individuals by name rather than by group or logical role, cannot be integrated into larger applications or existing communications systems, weak or incompatible security implementations.



LHC@FNAL: REMOTE OPERATIONS CENTER

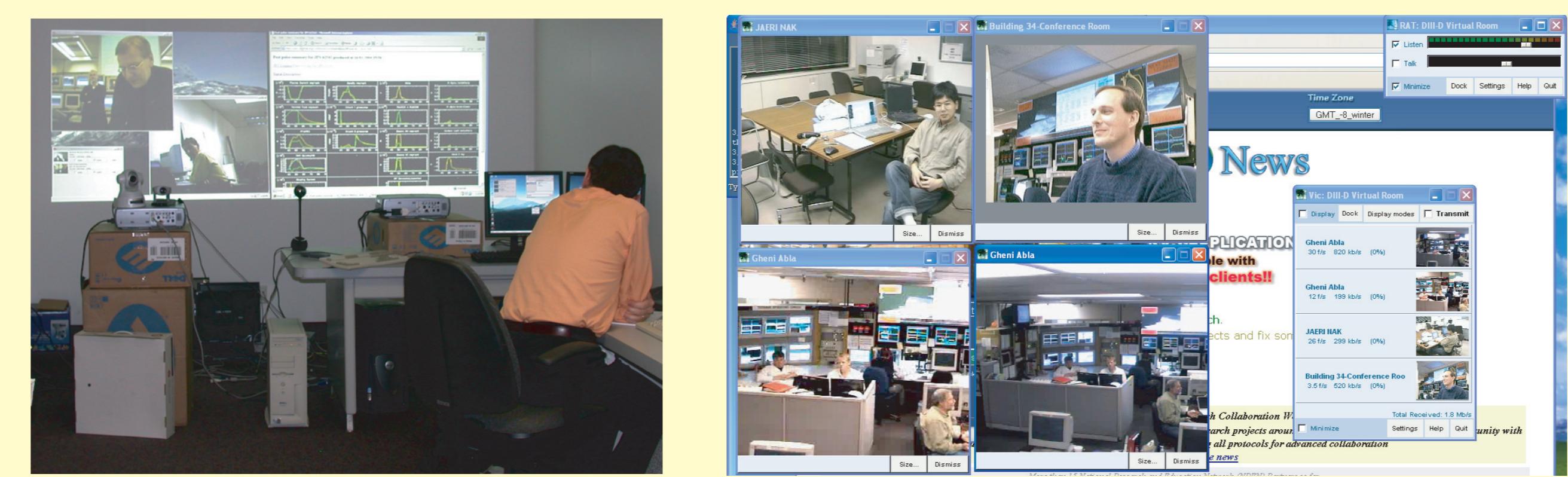


COLLABORATIVE WORK SPACE

FLEXIBLE AND EXTENSIBLE COLLABORATION FABRIC

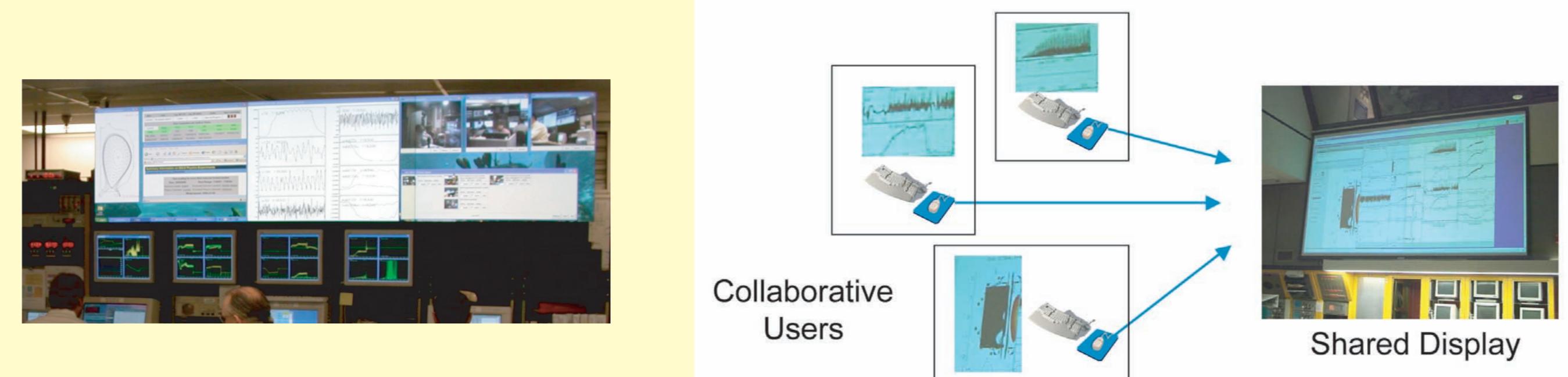
- Diverse ad hoc and structured interactions, personnel at different sites can engage in dialogues enriched by data flows with reduced communication barriers
- Converge physical and logical communication channels so that phone, audio, video email, messaging, and data integrated into a common framework
- Session Initiation Protocol (SIP) for its flexibility and extensibility and widely supported standard for Voice over IP (VoIP) allowing creation of mixed hardware/software systems.
- Advanced interactive directory service with automatically generated presence information, role-based "dialing" and dynamic call forwarding.

ACCESS GRID AND VRVS/EVO AS SIP ENABLED USER AGENTS



- Accommodate capabilities of available user agents, providing the richest environment that can be reasonably deployed to each.

DISTRIBUTED SHARED DISPLAYS

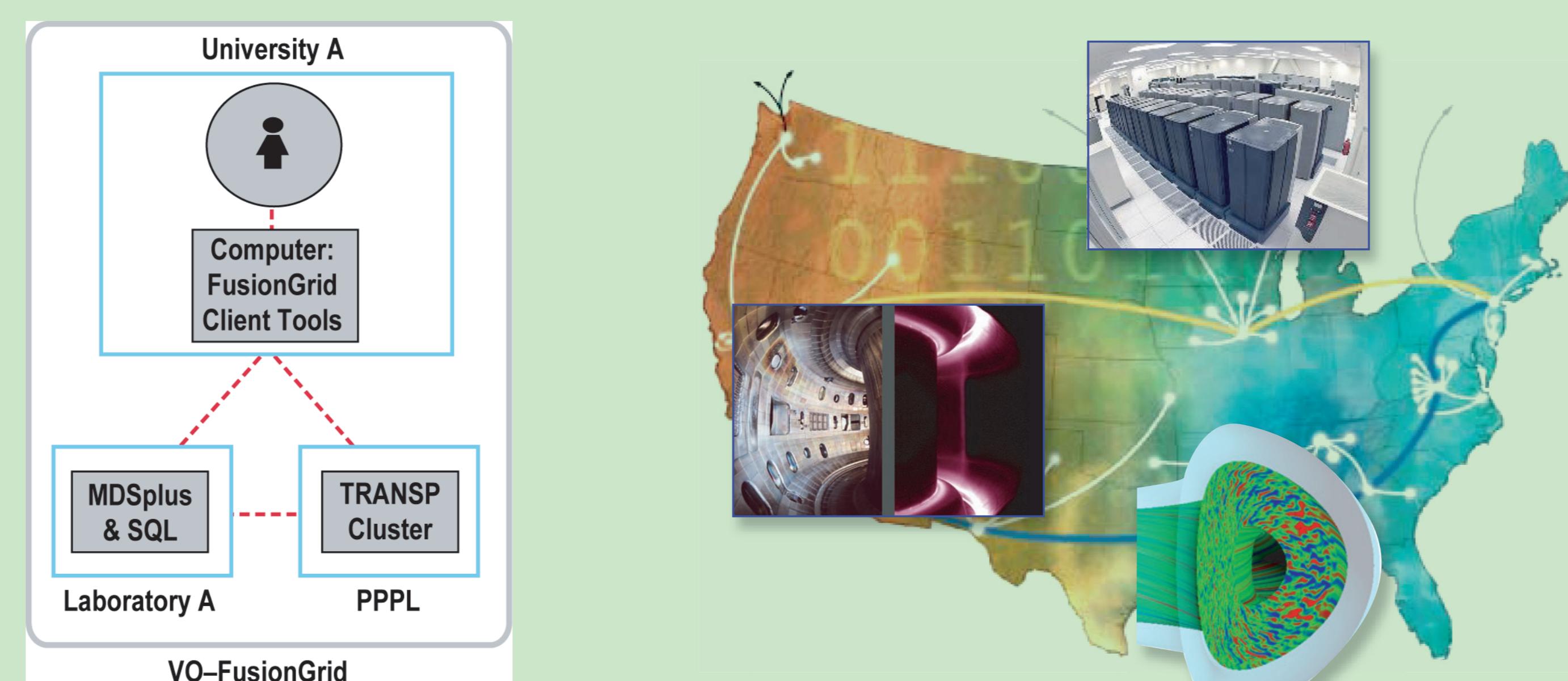


- Facilitate remote collaborative visualization in virtual control rooms and desktop environments
- Multi-writer consistency for multi-simultaneous updates to achieve collaborative visualization
- Consolidate network transfers to overcome bottlenecks arising from latency of long distance communication.
- Network bandwidth optimizer to reduce communication traffic via compression and intelligent caching.

SECURE COMPUTATIONAL SERVICES

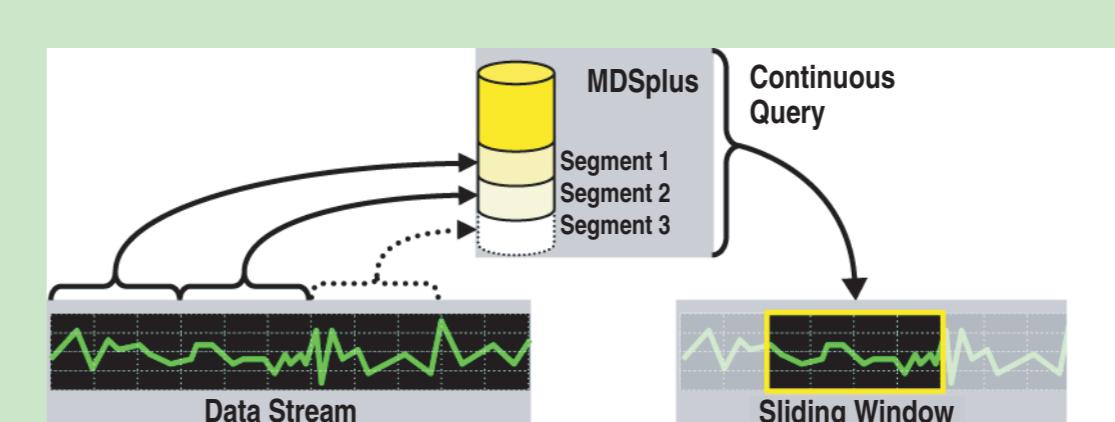
SERVICE ORIENTED COMPUTATIONAL AND DATA MANAGEMENT INFRASTRUCTURE FOR ACCESSIBILITY RATHER THAN PORTABILITY

- Add to existing FusionGrid computational services (e.g. CQL3D, GS2, TGLF/GKS and GNCM)



SECURE COMPUTATIONAL SERVICES

EXTEND MDSPLUS TO SUPPORT LONG-PULSE CONTINUOUS DATA SOURCES



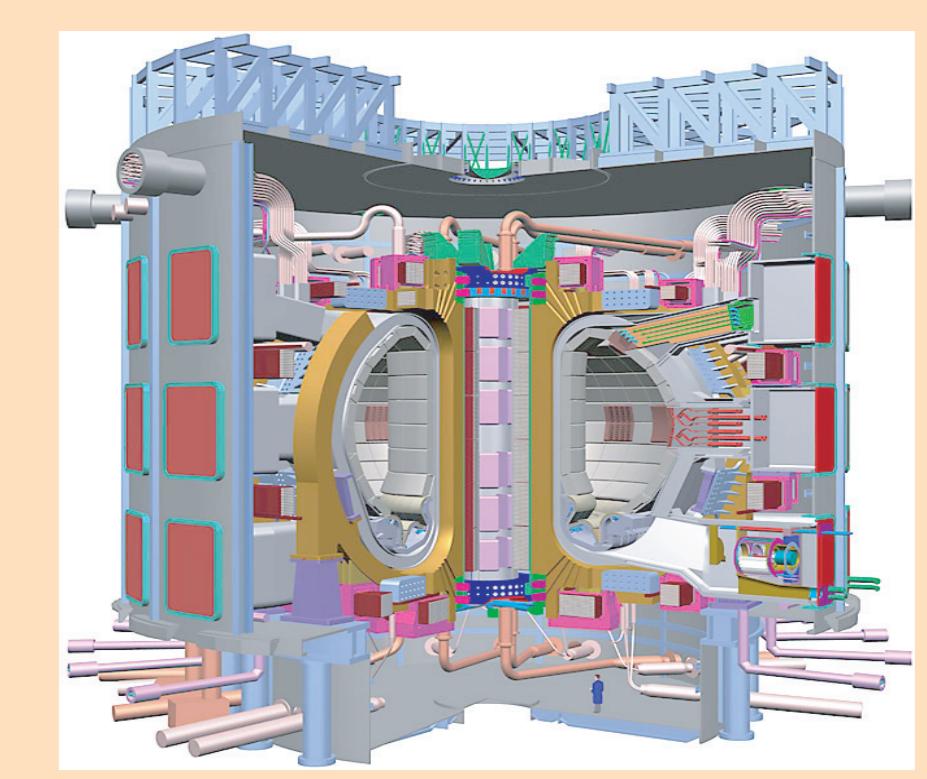
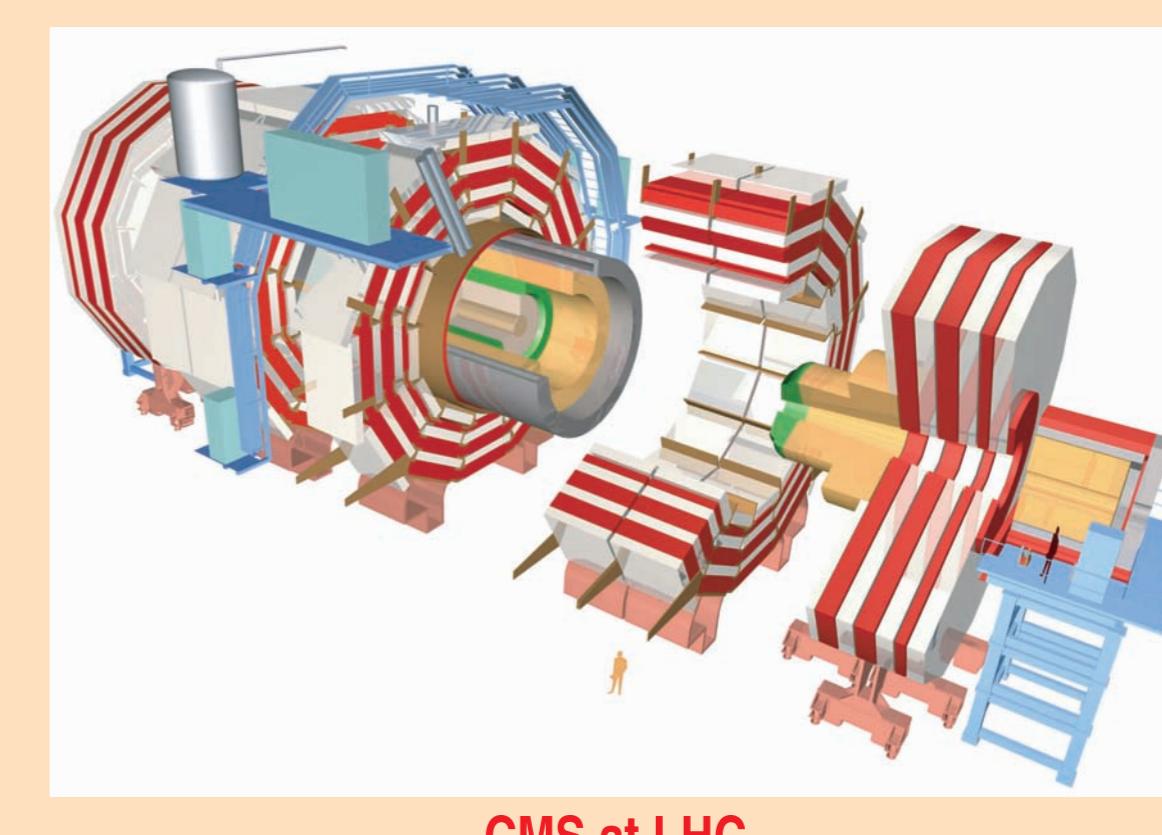
- Provide concurrent writing, reading, analysis and visualization of data segments from extremely records and databases
- Data sets can encompass 10^9 in time scales, efficient browsing, location, logging, tracking
- Improve data transfer to support native parallel I/O for high bandwidth high latency transfers
- Support near-term FES machines: EAST, MDE, LDX, KSTAR and ITE.
- Evaluate as means to provide remote access to mission-critical HEP controls data associated with detector systems

INTEGRATED SECURITY REQUIRED FOR INTERNATIONAL COLLABORATIONS

- User, Credential, and Authorization Manager (UCAM) for an international grid with heterogeneous authentication techniques; users and sites participate regardless of authentication scheme
- Combine present capabilities of FusionGrid authorization management system and credential management system into a single unified system
- UCAM to support varied authentication techniques for single sign-on including static passwords, one-time passwords, and X.509 credentials
- Role based authorization critical since experiments have different key roles that can change on a daily basis
- Role based authorization for remote operations in a manner consistent with safety considerations

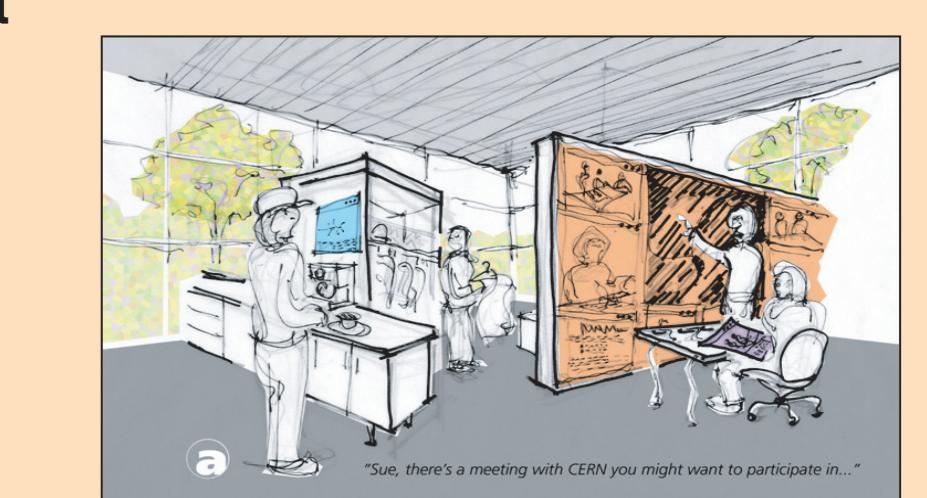
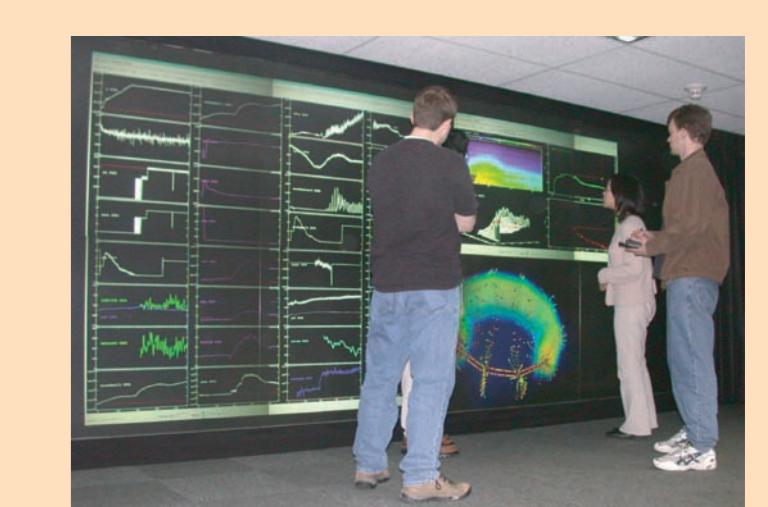
SUMMARY

THE SUCCESS OF FUTURE FES AND HEP SCIENCE BOTH TO THE U.S. AND THE WORLD REQUIRES A ROBUST REMOTE COLLABORATORY CAPABILITY



SECURE COLLABORATIVE WORKSPACES AND COMPUTATIONAL SERVICES

- New tools and technologies need to be developed and deployed into the FES and HEP working environments
- Standards based collaboration space - advanced tools for ad hoc and structured communications, shared applications and displays, enhanced interactivity for remote data access applications, controlled resource usage, computational services, and an improved security environment
- Prototype and test on current FES and HEP experiments and numerical simulation projects while maintaining a focus on the needs of next generation mega-projects (ITER and ILC)
- Existing computer science technology must be leveraged while taking advantage of commercial solutions - yet new development will be required



SCIDAC EMBODIES PATH TO SUCCESS

- Combine domain experts with computer science experts
- Significant progress has been made separately in FES and HEP
- Sufficient overlap between FES and HEP requirements, joint research into collaborative technologies will increase benefits to both
- Build on emerging technologies/standards and the convergence of telecommunications and computing technologies
- Responsive to user needs, interoperability in heterogeneous environments, robustness, and ease of use

